

**Declaration of Nikola Kirilov Kasabov, Ph.D., MSc.**  
**Under 37 C.F.R. 1.132**

I, Nikola Kirilov Kasabov, declare that:

1. I am a citizen of New Zealand.
2. I am Professor and Personal Chair, School of Computer and Informational Sciences, Auckland University of Technology, and I am founding Director of Knowledge Engineering and Discovery Research Institute, KEDRI, of Auckland, New Zealand. I have earned a Ph.D. from the Sofia Technical University, Bulgaria. I am author of 9 books, have edited 3 scientific research books, authored 38 book chapters, authored 106 peer-reviewed journal articles, authored 4 major reviews, authored 15 referred conference proceedings, 187 papers published in peer-reviewed conference proceedings. I have presented 41 invited keynote lectures to international meetings, published 14 volumes on computer software and am Inventor on 26 US or other patents and patent applications. I have been actively engaged in development of computerized methods for knowledge acquisition and analysis, and have been active in teaching, research and professional activities for many years. I am familiar with the state of the art of information sciences, artificial intelligence, knowledge engineering, bioinformatics, brain-like computing and neuroinformatics, signal, speech and image processing and parallel computing systems.. A copy of my Curriculum Vitae is attached to this Declaration as Appendix 1.
3. I am an inventor of US Application No: 10/524,754, filed 29 August 2005, entitled "Medical Decision Support Systems Utilizing Gene Expression and Clinical Information," which is a US National Phase application based on PCT International Application No: PC/US03/25563, filed 15 August 2003, which claims priority to US Provisional Patent Application No: 60/403756, filed 15 August 2002 (herein, the "754" application).
4. I have read the Office Action mailed 10 January 2008, and the references cited in rejecting the claims of the 754 application, namely Bagne, Slonim, Downs and Ben-Dor.
5. The pending claims are not obvious over combinations of Bagne and Slonim or Downs and Ben-Dor for at least the following reasons.
6. A person of ordinary skill at the time the application was filed would not know how to modify either combination of the above references to obtain the claimed subject matter.
7. The application as filed discloses steps that are not present in the prior art. The application as filed includes technical details, including exact steps and algorithms, the results of implementing those steps (e.g., the improved accuracy of the method), how those methods lead to the improved accuracy and how they are missing from the prior art.

8. A person of ordinary skill is a medical practitioner with access to separate gene expression and clinical information classifiers. Such available classifiers include regression formulas, Bayesian classifiers, neural networks, SVM, and other known models known in the art, or has separate data sets that allow him or her to create such separate classifiers.

9. A person of ordinary skill would apply the clinical data of a patient to the clinical data classifier and also apply the genetic data of the same patient to the gene classifier. According to the combined teachings of Downs and Ben-Dor or Bagne and Slonim, the person of ordinary skill would identify the classifier with the higher reported accuracy, and would consider the combined data to have that degree of accuracy.

10. Ben-Dor is a conference paper that discusses well-known methods and there is no mention of integrating several sources of information, such as genes and clinical data to improve accuracy and to extract integrated multivariate patterns.

11. Specifically, a person of ordinary skill could combine, using the MAX function, a gene expression classifier by Ben-Dor for example, and a clinical data classifier of Downs, for example, to achieve an accuracy of the best of them, but neither is covered by any prior publication.

12. Downs does not relate to our invention of integrated classifiers based on separate gene expression and clinical data or any other two or more separate data sets related to the same problem and its outcome. Downs demonstrates the use of the well-known fuzzy ARTMAP neural network model on a single clinical data set. The use of voting is to avoid one of the problems of the fuzzy ARTMAP, namely the dependence of the evolved structure on the order of the sample (example) presentation. However, this has nothing to do with our claimed methods. More specifically, the extracted rules based on Downs are only propositional and based on binary TRUE/FALSE input variables and output categories.

13. The rules extracted using our claimed methods are fuzzy, both quantitatively and qualitatively, and can take any type of variables, including binary, categorical or continuous. Our methods can thus link the continuous variable of gene expression with clinical variables, unlike the methods of Downs or Ben-Dor, or the combination of Downs and Ben-Dor together.

14. The above said is equally valid for Bagne and Slonim publications.

15. In the application (page 14), Lymphoma outcome predictions are provided as a case study.

16. A clinical data classifier built on clinical data only had a predictive accuracy of 73.2%. A gene expression classifier, built separately on gene expression data only, had an accuracy of 78.5%. If both clinical and gene expression data is available for a new

patient, the predicted outcome by the gene expression classifier will be considered only if it has a higher accuracy of outcome prediction than the accuracy based on clinical information. Thus, using the prior art methods, the patient prediction accuracy will be 78.5%.

17. If new data is available in which both gene expression information and clinical information is available, the person of ordinary skill would not be able to use the new data to combine with the two existing classifiers and achieve a higher accuracy than the accuracy of any of the classifiers.

18. Our claimed methodology for combining clinical and gene expression classifiers built separately for a better prediction on new data that has both variables measured, is explained in paragraphs 074 till 085 and Fig. 3b. An information scientist can implement the explanation into the following formulas:

Class unit layer:

Combined Class A Output:  $\text{ClassA output} = (C1/\text{classA} \times \beta1) + (C2/\text{classA} \times \beta2)$

Combined Class B Output:  $\text{ClassB output} = (C1/\text{classB} \times (1 - \beta1)) + (C2/\text{classB} \times (1 - \beta2))$

Decision layer (optional):

Combined output = (Combined ClassA output  $\times \alpha$ ) + (Combined ClassB output  $\times (1 - \alpha)$ ),  
The final output will be between 0 and 1. If close to 0, the diagnosis is Class A if close to 1, the final diagnosis is Class B.

The claimed methodology is illustrated with the use of three methods for calculating the introduced parameters  $\beta1$ ,  $\beta2$  and  $\alpha$ :

- Method (1): exhaustive search;
- Method (2): Statistical validation;
- Method (3): Backpropagation learning algorithm for a multilayer neural network.

Method one is broadly illustrated on a bench-mark data of Lymphoma outcome prediction published by Shipp et al in paragraphs 086 till 093 and in fig.4 and fig.5. The data has a clinical integrated variable IPI and a set of 11 gene expression variables.

19. In contrast with the prior art methods, our methods (1) and (3) disclose how to do that through tuning three parameters,  $\beta1$ ,  $\beta2$  and  $\alpha$  using the new data set. Applying our method (1) results on the same Lymphoma data in a combined classifier system with a much higher accuracy of 87.5% ! Method (2) of our invention discloses how two separate classifiers can be used on a single new patient data even if there is no other patient data set based on both clinical and gene expression data.

20. There are no prior art methods disclosed in Downs, Ben-Dor, Bagne or Slonim nor their obvious combinations, that provide how gene expression and clinical data sets related to the same problem (but not necessarily available as a combined data vector for each person) can be integrated into a combined classifier system that produces a better accuracy than any of the single data sets used. Neither of the combinations of Bagne and Slonim nor Downs and Ben-Dor suggest how gene and clinical variables can be integrated in a fuzzy rule (profile) of similar samples to improve the understanding in the interaction between the gene and the clinical variables.

21. The differences between the combinations of prior art references (Downs and Ben-Dor and Bagne and Slonim) and our invention are so large that they have not been overcome until our invention.

22. As a result of our claimed invention, the person of skill in the art is provided new methods and tools to improve diagnosis and evaluation of patient's condition. This desirable result was not possible prior to our invention.

23. All statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true, and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under §1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issuing thereon.

Date: 30.05.2008

By:



Nikola Kirilov Kasabov

**Appendix 1**  
**Copy of Curriculum Vitae**  
**Nikola Kirilov Kasabov**

# Curriculum Vitae

## Personal Information

### Name:

**Nikola Kirilov Kasabov**

[nkasabov@aut.ac.nz](mailto:nkasabov@aut.ac.nz)

<http://www.kedri.info>

### Qualifications

Qualification name:	Institution:	Date of Graduation:
PhD (Math. Sciences)	Technical University, Sofia	07.04.1975
MSc (Applied Math.)	Technical University, Sofia	30.09.1972
MSc (Comp. Science and Eng.)	Technical University, Sofia	30.09.1971

### Professional Affiliations/Memberships

RSNZ (Fellow of the Royal Society of New Zealand)  
NZCS (Fellow of the New Zealand Computer Society)  
IEEE (Senior Member, Institute of Electrical and Electronic Engineers)  
INNS (International Neural Network Society) – President-Elect  
APNNA (Asia-Pacific Neural Network Assembly) – President

### Distinctions (e.g., prizes, scholarships, invited memberships, notable posts, honorary degrees):

The Bayer Science Innovators Award, 2007  
The Vice Chancellors 2007 Awards for Research Excellence and Research Supervision  
DAAD Visiting Professorship, 2005-2006, Germany  
Asia Pacific Neural Network Assembly (APNNA) Excellent Service Award for overall contribution in the area of Neuro-information Processing and Intelligent Systems, 2005.  
President of the Asian Pacific Neural Network Assembly (APNNA), 1997-1998.  
International Neural Network Society, President-Elect  
IEEE (Institute of Electrical and Electronic Engineers), Computational Intelligence Society, Member of the Neural Networks Technical Committee, Chair Taskforce Evolvable Neural Systems, since 2004  
Best Paper Award, IEEE 2003 International Conference on Neural Networks & Signal Processing, Nanjing, China, December 2003.  
Fellow of the Royal Society of New Zealand, since 2001.  
The Royal Society of New Zealand Silver Medal for Contribution to Science and Technology, 2001.  
Senior Member of IEEE, since 2001.  
Fellow of the New Zealand Computer Society, since 2001.  
International Neural Network Society, Distinction, Washington DC, 1999.  
New Zealand FRST Award for supervision of a PhD student (M. Laws), 1999.  
Best paper award, The Fourteenth European Meeting on Cybernetics and System Research, University of Vienna, 04/1998.  
President of the Asian Pacific Neural Network Assembly (APNNA), 1997-1998.  
IFIP (International Federation for Information Processing), Member of committee 12 for Artificial Intelligence, since 1997  
NWO/SION (Dutch Organisation for Scientific/Computer Science) Research Grant, University of Maastricht, The Netherlands, 1998.  
Research Fellowship Grant, University of Twente, The Netherlands, 1998.  
Prize for Invention with High Practical Applicability, National Institute of Inventions, Bulgaria, 1992.  
Leverhulme Trust Research Fellowship, University of Essex, United Kingdom, 1989/90.  
Czechoslovakia, Research Fellowship, Institute of Cybernetics, Bratislava, 1987.  
Research Fellowship, Research and Education Ministry, The Netherlands, 1984.

### Languages (in addition to English)

Bulgarian, fluently written and spoken  
Russian, written and spoken  
German, limited

Italian, beginner

## Employment History

### (a) Present Position

Professor and Personal Chair, School of Computer and Information Sciences, Auckland University of Technology, since June 2002.

Founding Director, Knowledge Engineering and Discovery Research Institute, ([www.kedri.info](http://www.kedri.info)), Auckland University of Technology, since June 2002.

### (b) Employment History

- Professor and Personal Chair, Department of Information Science, University of Otago, 02/1999 – 06/2002.
- Founding Director, Knowledge Engineering/Discovery Laboratory, University of Otago, 1994 – 2002 (<http://kel.otago.ac.nz>).
- Associate Professor, Department of Information Science, 1996 to 1998.
- Senior Lecturer, University of Otago/Department of Information Science, 1992 – 1995.
- Research Fellow and Senior Lecturer, University of Essex (UK)/Department of Computer Science, 1989 – 1991.
- Associate Professor, Technical University (TU) (Sofia)/Department of Computer Science, 1988 – 1989.
- Director of International Graduate School in Artificial Intelligence, TU Sofia, 1988 – 1991.
- Lecturer and Senior Lecturer, TU Sofia/ Department of Computer Science, 1978 – 1988.
- Research Fellow, TU Sofia/Department of Computer Science, 1976 – 1978.

## Other Relevant Experience

### (a) Experience Working in Other Countries

Germany, DAAD Visiting Professor, U. Kaiserlautern, 1.10.2005-28.02.2006.

Italy, Visiting Professor, University of Trento: March-April 2001; March-June 2000; March – May 1998. The Netherlands, Visiting Research Fellow: University of Twente, 06/ 1998; University of Maastricht, 1-2/ 1998.

The UK, Leverhulme Trust Research Fellow, University of Essex, 1989-1990.

Czechoslovakia, Visiting Research Fellow, Institute of Cybernetics (Bratislava) 6-7/1987.

The Netherlands, Research Fellow, University of Delft, 2-7/ 1984.

### (b) National/International Collaboration

Collaboration with the Kyushu Institute of Technology, Japan, since 1993

Collaboration with the National Institute of Communication and Information Technologies, NiCT, Tokyo, Japan, since 2007

Coordinator and programme leader of a collaborative research project “Connectionist-based intelligent information systems” funded by FRST and NERF with the participation of researchers from universities and industrial organisations in New Zealand: Auckland University of Technology, University of Auckland, Crown Research Institutes, Lincoln University, PEBL, PSL, Navman, Fonterra, Genesis R&D, ViaLactia and other organisations in NZ; 1995-2007.

Research associate and consultant: Pacific Edge Biotechnology Ltd. - PEBL NZ, since 1997; NZ Bio-protection CoRE - Centre of Research Excellence, Lincoln, since 2003; SCOPE Project – U.Auckland, since 2002; RASP project – U.Auckland, since 2007.

Director, NZ Bioinformatics Summer School, 2003 and 2004.

Executive Committee and Scientific Committee member, Berkeley International Institute for Systems and Computational Intelligence, BIISC, UC Berkeley, since 2004

Coordinator of SIG “Computational Intelligence in Bioinformatics” as part of BISC (Berkeley Initiative of Soft Computing), Department of Computer Science and Electrical Engineering, University of California at Berkeley, USA, since July 2002.

Visiting researcher, National Cancer Institute, National Institute for Health - NIH, Frederick, Washington DC, since May 2002.

Co-ordinator of exchange programmes, University of Twente and University of Maastricht, The Netherlands, since 1998.

Co-ordinator of a research and teaching exchange agreement, Kyushu Institute of Technology, Japan, since 1996

RIKEN, Brain Science Institute, Japan, Collaboration on research projects, since 2001.

Founder of the Bioinformatics Group, Technical University of Sofia – branch Plovdiv, Bulgaria, 2004

The International Consortium for Speech Translation Advanced Research, C-STAR II, Affiliate member, 1996-1999.

## Research Activities

### (a) Research Expertise

Information Sciences

Artificial Intelligence (Neural Networks, Fuzzy systems, Evolutionary Computation)

Knowledge Engineering

Bioinformatics

Brain-like computing and neuroinformatics

Signal, Speech and Image Processing

Parallel Computer Systems

### (b) Experience in Applied R & D, contract research, consultancies, patents

Co-founder and Chief information scientist of *Pacific Edge Biotechnology Ltd*, [www.pebl.co.nz](http://www.pebl.co.nz), established in 2001, based in Dunedin, New Zealand.

Founder of *Knowledge Engineering Consulting Ltd*, [www.keconsult.com](http://www.keconsult.com), established 2001.

Consultant: PEBL (since 1997); ViaLactia Biosciences, Auckland (2005); FONterra, Auckland, since 2004; Lucent-Telecom, since 2005; Fidelity genetics (since 2005); Bimetric technology Ltd (since 2005); Waste Solutions Ltd, Dunedin (1994-2001); Hort Research (since 1996); Steel Manufacturing Company Kremikovtsi, Sofia, Bulgaria (1988 - 1992); Institute for Agricultural Research, Plovdiv, Bulgaria (1987-89); Medical Academy, Sofia, Bulgaria (1987-88).

Patents – total 26: 2 New Zealand (2 PCTs), 6 USA, 1 UK, 1 France, 1 Germany, 1 Russia, 1 Czechoslovakia, 13 Bulgaria,

### (c) Research Grants

#### Last 10 Years

##### (1) Principal or joint principal researcher

- 2002/2007, NERF, Connectionist-Based Intelligent Information Systems, \$360,000 p.a
- 2006, Fonterra, Predicting milk volume production, NZ\$78,000
- 2006, Telecom/Lucent/Medialab, Close loop optimisation, NZ\$70,000
- 2002/2006, HRC, Predicting colorectal cancer outcome using gene expression profiling, \$300,000 pa
- 2002/2004, Cancer Society of NZ, Neuroblastoma treatment prediction and classification systems, \$80,000pa
- 2003/2004, Fonterra, Evaluation of evolving connectionist techniques and their applications, \$55,000
- 2004, ViaLactia Biosciences, NZ herd phenotype quality analysis, \$75,000.
- 2001, University of Otago, Connectionist-Based Information Systems, Emerging Theme Research, \$20,000, 01.01.01 – 01.01.02
- 2000, University of Otago, Connectionist-Based Information Systems, Emerging Theme Research, \$20,000, 01.01.00 – 01.01.01
- 1999, University of Otago, Connectionist-Based Information Systems, Emerging Theme Research, \$15,000 01.01.99 – 01.01.00
- 1998/2002, FRST and NERF, Connectionist-Based Intelligent Information Systems, \$360,000 p.a., 1.07.98 - 1.07.2002
- 1996/98, FRST UOO-606, Connectionist-Based Information Systems, \$385,000 p.a., 1.07.96-1.07.98
- 1995/98, FRST UOO-509, Spatial Analysis Systems and Management, \$303,000 p.a., 30.10.95-30.10.98
- 1997/98, University of Otago, Connectionist Based Information Systems, Emerging Research Theme, \$15,000, 1.07.97-1.07.98

- 1998/99, Otago Research Grant, Adaptive neuro-fuzzy methods in pharmaceutical sciences, \$30,000, 1.7.98 - 1.7.99
- 1997/98, Otago Research Grant, Neuro-fuzzy methods in pharmaceutical sciences, \$35,000, 1.7.97 - 1.7.98
- 1995, Otago Research Grant, Methods and Tools for Building Adaptable Speech Interfaces to Standard and Fuzzy Databases, \$25,193, 1.1.95-30.11.95
- 1995-1997, Waste Solutions Ltd, Neuro-Fuzzy Control, \$20,000, 1.7.95-31.12.96
- 1994/95, FRST, Development of a Spatial Analysis Tool Box, \$57,000, 30.10.94-30.10.95
- 1994, TELECOM New Zealand Ltd, Automatic Speech Recognition, \$24,500, 1.5.94-31.12.94
- 1994, Departmental Research Grant, A Software Environment for Building Fuzzy Connectionist Production Systems - FuzzyCOPE, \$10,000, 30.5.94-28.2.95

(2) Contributing researcher:

2007-2008, Health Research Council, RASP – Rapid assessment of smoking status using change in acoustic parameters of voice, U.Auckland, 150,000\$

2004-2008, NERF, SCOPE – Predicting abnormalities in pregnancy (Program leader - Assoc.Prof. Robyn North, University of Auckland), 1.5 mln pa

1999/2001, Policy problems and policy options under alternative monetary regimes, with special reference to Italy in the EMU, University of Trento, Italy, IL700 mln, with Prof. Axel Bengt, Prof. M.Fedrizzi and Prof. L.Erzegovesi.

1998/2000, FRST, Biological Orchard Production Systems, appr.\$200,000 p.a., 1.7.1998 - 1.7.2002, Dr. H.Wearing, HortResearch

1998/2002, FRST, Distributed Information Systems, appr.\$350,000 p.a., 1.01.98- 31.12.2002, Dr. M. Purvis

1998/2002, FRST, Spatial Analysis Systems and Management, appr.\$100,000 p.a., 1.10.1998 - 1.10.2002, A/Prof. G.Benwell.

Prior to the Last 10 Years

Principal researcher of projects funded by the Bulgarian Ministry of Science and Technology (BMST): Parallel processing systems (1989-1991); Expert systems for agricultural applications (1988-91); Expert systems for planning and decision making (1988-1991); Intelligent tutoring systems (1987-1989); The design and the implementation of GESMI- an expert system shell (1985-87). Principal researcher of projects funded by the Bulgarian National Institute of Inventions: Stack memory device (1985-87); Multi-register memory systems (1984-1986). Principal researcher of academic and industrial projects in Bulgaria (1974-1988): Multi-microprocessor systems for the Metallurgy Industry (1984-1988); Bubble-domain memories for computer systems (1984-86); Performance evaluation of computer systems (1978-1980); Information systems for financial operations in the Kazanluk textile industry (1974-1975).

(d) Supervision of Postgraduate Students  
Completed in the last 10 Years

Vishal Jain, System biology – data analysis, modelling and knowledge discovery, completed 2008

Simei Wysosky, Brain like speech and image integration methods and systems, AUT, completed 2008

Maggie Ma, Evolving connectionist systems for decision support in medical prognosis, NZ Top Achiever Doctoral Scholarship TAD, AUT, completed 2008

Paulo Gottgroy, Methodology and a framework for ontology building on the case study of biological and medical data, TAD, AUT, completed 2008.

David Zhang, Integrating speech and image signals in intelligent systems. AUT, completed 2008

PhD, Liang Goh, Methods for information integration and knowledge discovery on gene expression data, Auckland University of technology, 2002-2005

PhD, David Parry, On-line intelligent data mining for medical data, AUT, 2000-2005

PhD, Evolving connectionist systems. Michael Watts. University of Otago, 1999-2004

PhD, Connectionist-based adaptive expert systems and image analysis in horticulture, Brendon Woodford, University of Otago, 1999-2004

PhD, Microarray Gene Expression Data Analysis and Knowledge Discovery, Matthias Futschik, University of Otago, NZ, 2000-2003.

PhD, Signal processing and acoustic modelling for speech recognition systems, Waleed Abdulla, University of Otago, 1998-2002.

PhD, Evolving connectionist systems for dynamic modelling, Q.Song, University of Otago, 1998-2002.

PhD, Maori language integration in the age of information technology: computational approach, Mark Laws, University of Otago, 1998 -2002.

PhD, Connectionist systems for speech recognition, R.Kilgour, University of Otago 1997-2001.

PhD, Neuro-fuzzy techniques for intelligent systems, J. Kim, University of Otago, 1996-1999

PhD, Probabilistic-connectionist processing to improve image pattern recognition, S. Israel, University of Otago, 1995-1999

PhD, Connectionist production systems, TU, Sofia, Bulgaria, S.Shishkov, 1990-1994

PhD, Denotation semantics for AI, TU, Sofia, Bulgaria, N.Nikolaev, 1990-1994

MPhil, Production systems on associative memories, T. Lin, University of Essex, 1990-92.

MSc, N.Mohan, Transductive reasoning and personalised modelling, , 2005

MSc, Andreas Magusin, Bi-clustering in bioinformatics, Auckland University of Technology, 2003-04

MSc, On-line decision support systems in bioinformatics, M.Middlemiss, University of Otago, 2001.

MSc, A Bilingual speech interface for New Zealand English to Maori, M. Laws, University of Otago, 2001

MSc, Hybrid systems and neural networks for speech recognition, R.Kilgour, University of Otago, 1994 - 1996.

MCom, Intelligent systems for control, M.Bailey, 1997

MCom, S.Sinclair, Multi-modular speech recognition systems, University of Otago, 1997

MSc, Speech recognition and neural networks, TU Sofia, D. Nikovski, 1992.

MSc, Hybrid system COPE, TU Sofia, Bulgaria, C. Neshev, 1992.

MSc, Machine learning, TU Sofia, Bulgaria, S. Petrova, 1992.

MSc, FLIPS Fuzzy Expert System, TU Sofia, Bulgaria, T.Dekova, 1992.

MSc, Neural networks for game simulation, TU Sofia, Bulgaria, P. Kalinkov, 1992.

MSc, L. Chen, Simulation of CLIPS on associative computer memory, University of Essex, 1990.

MSc, C. Tan, Template-based learning, University of Essex, 1990-1991.

Currently supervising PhD students:

Harya Widiputra, Dynamic interaction networks for multiple financial time series prediction, 2007-

Stefan Shliebs, Quantum neurocomputation, AUT, since 2007

Raphael Hu, Integrated bioinformatics, AUT, since 2007

Anju Verma, Personalised decision making based on gene data, AUT, since 2005

Francis Josef, Design and computational intelligence, since 2006

Boris Bacic, Connectionist and hybrid methods for video data analysis, AUT, since 2003.

Snejana Soltic, Intelligent Decision Support systems and image data analysis, AUT, since 2003.

Akbar Ghobakhloo, PhD Adaptive Speech Recognition Systems, University of Otago, since 1999.

Jay Swope, Modelling of bio-medical time series, University of Otago, since 1998.

Prior to the Last 10 Years

Supervised 43 successful MSc dissertations (1977-1990), Technical University of Sofia, Department of Computer Science.

Supervised 5 successful postgraduate diplomas in Artificial Intelligence, International Graduate School of AI, technical University of Sofia (1988 -1991).

**Teaching activities**

Introduced and taught the following academic courses:

Knowledge engineering and intelligent systems, TU Kaiserlautern, Germany, (Postgr. level), 2005/06

Evolving connectionist systems (Qualification level), Singapore, Malaysia, 2002,2003 and 2004.

Data mining and knowledge engineering, (Masters level), Auckland University of Technology, since 2003

Bioinformatics, (Masters level), Auckland University of Technology, since 2004

Data, information and knowledge (Undergraduate level), University of Otago, NZ, 2001

Intelligent systems (Undergraduate level), University of Otago, NZ, 1993

Neural networks and fuzzy systems, 1993 -2002 (Postgraduate level) University of Otago, NZ (The course was re-named to "Advanced knowledge engineering" in 1999)

Programming techniques, (Undergraduate level), 2000-2001, University of Essex, UK

Expert systems (Postgraduate level), 1984, Technical University of Sofia, Bulgaria

Parallel processing (Postgraduate level), 1984, Technical University of Sofia, Bulgaria

Analysis and synthesis of algorithms, (Undergraduate level), 1980, Technical University of Sofia, Bulgaria

Computing (Undergraduate level), 1978, Technical University of Sofia, Bulgaria

## Publications

### (a) Books

#### Authored

1. Kasabov, N. *Evolving Connectionist Systems: The Knowledge Engineering Approach (new edition)*, Springer Verlag, London, (2007) 458p
2. Benuskova, L. and N.Kasabov, Computational neuro-genetic modelling: Integrating bioinformatics and brain science data, information and knowledge via computational intelligence, Springer, New York, 2007, 290 pages
3. Kasabov, N. *Evolving connectionist systems: Methods and applications in bioinformatics, brain study and intelligent machines*, Springer Verlag, London, (2003) 308p
4. Kasabov, N. *Foundations of Neural Networks, Fuzzy Systems and Knowledge Engineering*, Cambridge, Massachussets, MIT Press (1996) 550p
5. Kasabov, N. and Romanski, R. *Computer Architectures and Techniques* Sofia, Technika (1992) 435p (in Bulgarian)
6. Stoichev, S. and Kasabov, N. *Programming in PASCAL*. Sofia, Technika (1989) 136p (in Bulgarian)
7. Stoichev, S. and Kasabov, N. *Synthesis and Analysis of Algorithms*. Sofia, Technika (1988) 84p (in Bulgarian)
8. Stoichev, S. and Kasabov, N. *Computer Architectures and Techniques*. Sofia, Technika (1986) 348p (in Bulgarian)
9. Stoichev, S. and Kasabov, N. *Computers - Theory and Practice (Programming of Microprocessors)*. Sofia, Technika (1984) 120p (in Bulgarian)

#### Edited scientific, research books:

1. Kasabov, N. (ed.) *Future Directions for Intelligent Systems and Information Sciences*, Heidelberg, Physica-Verlag (Springer Verlag) (2000), 420pp
2. Kasabov, N. and Kozma, R. (eds.) *Neuro-Fuzzy Techniques for Intelligent Information Systems*, Heidelberg, Physica-Verlag (Springer Verlag) (1999), 450pp
3. Amari, S. and Kasabov, N. (eds.) *Brain-like Computing and Intelligent Information Systems*, Singapore. Springer Verlag (1998), 533 p.

### (b) Book Chapters

1. N Kasabov, V Jain, L Benuskova, P Gottgtroy and F Joseph, Integration of Brain-Gene Ontology and Simulation Systems for Learning, Modelling and Discovery, In: Computational Intelligence in Medical Informatics, Series: Studies in Computational Intelligence, Vol. 85, Editors: Arpad Kelemen, Ajith Abraham, Yulan Liang, ISBN: 978-3-540-75766-5, 2008
2. N Kasabov, Q Song, L Benuskova, P Gottgtroy, V Jain, A Verma, I Havukkala, E Rush, R Pears, A Tjahjana, Y Hu, S MacDonel, Integrating Local and Personalised Modelling with Global Ontology Knowledge Bases for Biomedical and Bioinformatics Decision Support, in: Smolin et al (eds) Computational Intelligence in Bioinformatics, Springer, 2008
3. Ravi, V., Kumar, P.R, Srinivas, E.R., Kasabov, N.K. A Semi-Online Training Algorithm for Radial Basis Function Neural Networks: Application to Bankruptcy Prediction in Banks, Chapter XV in: V.Ravi (ed) Advances in Banking Technology and Management, Information Science Reference, Hashley-New York, pp. 243-260
4. N.Kasabov, Brain-, Gene-, and Quantum Inspired Computational Intelligence: Challenges and Opportunities, in: W. Duch and J. Manzduk (eds) Challenges in Computational Intelligence, Springer, 2007 ISBN: 978-3-540-71983-0, 193-219

5. Gottgtroy P., Kasabov N., Macdonell S., Evolving Ontologies for Intelligent Decision Support, Elsevier, Fuzzy Logic And The Semantic Web, Chapter 21, pp 415-439, 2006
6. Kasabov, N. , Liang Goh and Mike Sullivan, *Integrated Prognostic Profiles: Combining Clinical and Gene Expression Information through Evolving Connectionist Approach*, Chapter 10, in: Bajic. V and Tan Tin Wee (eds), Information Processing and Living Systems, Imperial College Press, Singapore, 2005, 695-706.
7. Kasabov, N. , Zeke Chan, Vishal Jain, Igor Sidorov and Dimiter Dimitrov, *Computational Modelling of Gene Regulatory Networks*, Chapter 8, in: Bajic., V and Tan Tin Wee (eds), Information Processing and Living Systems, Imperial College Press, Singapore, 2005, 673-686.
8. Kasabov, N., Z.Chan, Q.Song and D.Greer, Evolving neuro-fuzzy systems with evolutionary parameter self-optimisation, chapter in: *Do Adaptive Smart Systems exist?* Springer Verlag, Series Study in Fuzziness, vol.173, 2005
9. Kasabov N., and L. Benuskova, *Theoretical and Computational Models for Neuro-, Genetic-, and Neuro-Genetic Information Processing*, in: M. Rieth and W. Sommers (eds) Handbook of Theoretical and Computational Nanotechnology, Vol. X pp 1-38, American Scientific Publisher, 2005
10. Dimitrov, D. S., Igor A. Sidorov and Nikola Kasabov *Computational Biology*, in: M. Rieth and W. Sommers (eds) Handbook of Theoretical and Computational Nanotechnology, Vol. 1 (1) American Scientific Publisher, Chapter 21,2004
11. Kasabov, N. and D. Dimitrov, *Discovering gene regulatory networks from gene expression data with the use of evolving connectionist systems*, chapter in: L.Wang and Rajapakse (eds) Neural Information Processing, Volume 152, Springer Verlag, 2004
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179. Kasabov, N. *Structural realisation of homogenous probability automata* in Proceedings of the 5<sup>th</sup> International Symposium on Applied Aspects of Automata Theory, Bulgarian Academy of Sciences, Varna, Bulgaria (1979) 49-54

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183. Dakovski, L., and Kasabov, N. *About implementation of sequential circuits in computational modules* in Proceedings of the Radio and Communication Annual Symposium, Sofia, Bulgaria (1978) 57-61
184. Dakovski, L., and Kasabov, N. *Logical-, register- and system design in homogenous cellular structures* in Proceedings of the Radio and Communication Annual Symposium, Sofia, Bulgaria (1978) 91-95
185. Borovski, B., Egorov, A., and Kasabov, N. *Probabilistic models for evaluating the performance of computer systems* in Proceedings of the Radio and Communication Annual Symposium, Sofia, Bulgaria (1978) 78-83
186. Kasabov, N. *On the generation of algebraic transformations and the design of discrete systems – possibilities and problems* in Proceedings of the Radio and Communication Annual Symposium, Sofia, Bulgaria (1977) 75 - 79
187. Dakovski, L., and Kasabov, N. *Structural synthesis of random number generators* in Proceedings of the 2<sup>nd</sup> Bulgarian Conference on Computer Science, Sofia, Bulgaria (1973) 86 – 91

(g) Other Significant Conference Activities

Invitational Addresses, Keynote Speeches

1. 2008, Plenary Talk, Brazilian Congress on NN, October 2008
2. 2008, Plenary Talk, World Congress of Computational Intelligence WCCI 2008 – Workshop on Novel Computational Intelligence Techniques, Hong Kong-Macao, 7-8.06.2008
3. 2008, Plenary Talk, World Computer Congress WCC2008, Milano, 7-10.09.2008
4. 2008, Invited Talk, BioMed, Kuala Lumpur, 25-28.06.2008
5. 2007, Plenary talk, Automatics and Informatics 2007, Sofia, Bulgaria, October, 2007
6. 2007, Plenary talk, HIS 2007, Germany, September, 2007
7. 2007, Invited talk, Dynamic Brain Forum, Hakuba, Japan, March, 2007
8. 2006, Keynote speech, KES'2006, Bournemoth, UK, October 2006
9. 2006, Invited talk, ICONIP'2006, Hong Kong, October 2006
10. 2006, Keynote speech, Int. Conference 9<sup>th</sup> Fuzzy Days, Dortmund, Germany, September 2006
11. 2005, Keynote talk, BCS AI 2005, Cambridge, UK, December 2005
12. 2005, Invited talk, BISCSE, UC Berkeley, 3-5, November, 2005
13. 2005, Keynote speech, SOFA Int. conference, Szeged-Arad, Hungary, August 2005
14. 2005, Keynote speech, SAER, Varna, 2005, Bulgaria
15. 2005, Keynote speech, BioInfo, Plovdiv, Bulgaria
16. 2005, *Invited talk*, ARSO'2005 – Advanced Robotics and their Social Impact, Nagoya, June 2005
17. 2005, Keynote speech, Intern. Symposium on Computational Intelligence, Korea, 1-2 Febr.2005
18. 2004, Keynote speech, Int. Conf. on Hybrid Intelligent Systems, HIS'04, Kitakushu, Japan, December 2004
19. 2004, *Keynote speech*, ICONIP'2004 - Int. Conf. Neuro Information Processing, Calcutta, 2004
20. 2004, *Keynote speech*, The Founding meeting for the German chapter of the IEEE Computational Intelligence Society, Keiserslautern, July 2004
21. 2004, *Open lecture*, Bioinformatics: The knowledge engineering approach, Technical University of Sofia, branch Plovdiv, Bulgaria, July 2004
22. 2004, *Plenary talk*, IEEE Symposium on Intelligent Systems, Varna, Bulgaria, June
23. 2002, *Invited talk*, ICONIP'2002, November, Singapore
24. 2002, *Keynote speech*, Int. conference on Industrial Applications of Intelligent and Expert Systems, IAE, Cairns, June 2002
25. 2001, *Plenary Chair and invited talk*, CEC'2001, Seoul, Korea
26. 2000, *Invited talk*, ICONIP'2000, Tainan, Korea
27. 2000, *Closing Speech*, Iizuka'2000, Fukuoka, Japan, 1-4 October 2000.
28. 1999, *Invited lecture*, Innovation in wastewater treatment, national seminar, Auckland, 30/04/99
29. 1998, *Keynote presentation*, 3<sup>rd</sup> *On-line World Conference on Soft Computing in Engineering Design and Manufacturing*, 21-30 June 1998, World Wide Web
30. 1998, *Keynote speech*, Neuro-Fuzzy Day, 11 June 1998, University of Twente, The Netherlands
31. 1998, *Invited talk*, Fuzzy neural networks and speech recognition, *International workshop on Future Devices for Human-Computer Interaction*, Japanese Ministry for Science and Technology, Beppu, Japan, 16-24 January, 1998

32. 1997, *Opening lecture*, Connectionist-based systems in the age of technology, *ICONIP'97*, Dunedin, 24-28 November 1997
33. 1996, *Keynote speech*, International Discourse on Fuzzy Logic and the Management of Complexity FLAMOC'96, Sydney University of Technology, 15-18 January (1996),
34. 1996, *Invited talk*, International Conference on Neural Information Processing *ICONIP'96*, Hong Kong, 14-18 September, 1996,
35. 1996, *Invited talk*, International Conference on Fuzzy Systems, Neural Networks and Soft Computing, Iizuka'96, Japan, Kyushu Institute of Technology,
36. 1996, *Invited talk*, International Panel Conference on Soft and Intelligent Computing, *SIC'96*, Budapest
37. 1995, *Invited talk* (with T.Cohen, M.Bailey, P.Mason), Annual Conference of the New Zealand Biotechnology Association, Dunedin, 30 August,
38. 1994, *Keynote speech*, New Zealand Computer Society, ANNES SIG national seminar, Auckland
39. 1994, *Keynote speech*, New Zealand Computer Society, ANNES SIG national seminar, University of Otago,
40. 1982, *Invited talk*, Stack Memory Devices. *International conference on Memory Devices '82*. Veliko Turnovo, Bulgaria
41. 1982, *Invited talk*, Utilisation of the semigroup theory for exchange operations in magnetic domain memory. *International conference on Memory Devices*, Veliko Turnovo, Bulgaria

*Tutorials and Workshops presented at International Conferences*

1. 2007, Tutorial on evolving intelligent systems, *ICANN 2007*, Porto, September 2007
2. 2007, Tutorial on evolving intelligent systems, *IJCNN 2007*, Orlando, August, 2007
3. 2007, Tutorial on evolving intelligent systems, *IEEE Simposia*, Hawaii, April 2007
4. 2006, Tutorial on evolving intelligent systems, *ICANN*, September 2006, Athens
5. 2006, Tutorial on evolving intelligent systems, *WCCI 2006*, Montreal, August, 2006
6. 2005, Tutorial on evolving connectionist systems, *IJCNN'05*, Montreal, July 2005
7. 2005, Tutorial on evolving connectionist systems, *ICANN'05*, Warsawa, Sept. 2005
8. 2004, Tutorial on evolving connectionist systems, *ICONIP'04*, Calcutta, Nov. 2004
9. 2004, Tutorial on data mining and knowledge discovery in bioinformatics, Int. Joint Conf. on Neural Networks - *IJCNN*, Budapest, 2004
10. 2003, Adaptive neural networks for data mining and knowledge discovery, Tutorial at the Int. Joint Conf. on Neural Networks (*IJCNN'03*), July 2003, Portland, Oregon, IEEE and INNS
11. 2003, Knowledge-based Neural Networks for Bioinformatics, University of California at Berkley, BISC Workshop on FLINT-CIBI (USA)
12. 2000, Evolving Connectionist Systems: Methods, Tools, Applications, Tutorial at *ICONIP'2000* (Taejon, Korea)
13. 2000, Evolving connectionist systems, Tutorial , *euroComputation conference NC'2000* (Berlin)
14. 1999, Workshop "Future directions for intelligent systems and information sciences", Dunedin, November 1999
15. 1999, Evolving connectionist systems – methods, tools, applications, Tutorial, *ICONIP'99*, November 1999, Perth (1999)
16. 1999, Speech and language recognition, Tutorial Track at *IJCNN'99*, Washington DC, July 1999
17. 1997, Connectionist-Based Intelligent Information Systems, Tutorial, *ICONIP'97*, Dunedin, 24-28 November 1997
18. 1997, Hybrid Connectionist-Based Intelligent Information Systems - Methodologies, Tools, Industrial Applications, Tutorial, World Manufacturing Congress, *WMC'97*, 18 November 1997, Auckland
19. 1997, AI/GIS systems and their applications, Tutorial, The Second Annual Conference on *GeoComputation*, Dunedin, June 1997
20. 1997, Hybrid Intelligent Information Systems, Tutorial, *ICNN'97* (The IEEE International Conference on Neural Networks), Houston, USA, May
21. 1996, Hybrid AI/GIS systems and their applications, Tutorial, Australian Urban and Resource Planning Information Society *AURISA'96*, Hobart, November 1996
22. 1996, Hybrid (neuro-fuzzy) intelligent information systems: methods, tools, industrial applications, Tutorial at *Iizuka'96*, (International Conference on fuzzy systems, neural networks and soft computing), Iizuka, Japan, September 1996

23. 1995, Intelligent Hybrid Systems for Problem Solving and Knowledge Acquisition, Workshop at the Second New Zealand International Conference on Artificial Neural Networks and Expert Systems ANNES'95, Dunedin, November 1995
24. 1995, Hybrid (Connectionist, Fuzzy, Symbolic) Environments and Their Applications for Building Complex Decision Making Systems, Tutorial, International Conference on Neural Information Processing (ICONIP'95- Beijing), Beijing, 1995
25. 1995, Fuzzy Data Analysis, Workshop, Eight Colloquium of the Spatial Information Research Centre of the University of Otago, Palmerston North.
26. 1994, Hybrid (Symbolic-, Connectionist-Fuzzy-, Chaotic) Systems, Tutorial, AI'94 - the Joint Australian Conference on Artificial Intelligence, Armidale
27. 1993, A. The Basics of Fuzzy Systems, Tutorial, ANNES'93 conference, Dunedin, U. Otago
28. 1993, Neural Networks for Problem Solving. Tutorial, ANNES'93 conference, Dunedin, U. Otago

(h) Audio-Visual Recordings

- 2000, Smart Voice Technologies, CD, Information Science Department, University of Otago.
- 1999, Kasabov, N. and W. Abdulla, Speech and language Processing, Tutorial Track 8, CD, IJCNN'99, Washington DC , July 1999
- 1998, N.Kasabov et all, Connectionist-based Information Systems, CD with the UOO606 FRST project results (software, papers) (1998)
- 1996, with T. Cohen and M. Bailey, Fuzzy system implementation on the Fisher & Paykel's PSC-III, Video film, in collaboration with the University of Otago Audio Visual Centre

(i) Computer Software

1. D. Greer, N. Kasabov, Q. Song, L.Goh – *Siftware: A Gene Expression Profiling Software*, 2003-2005
2. P.Hwang, D. Greer, N. Kasabov, Q. Song, P. Pang, *NeuCom – A Neurocomputing environment for intelligent decision support systems*, ([www.the-neucom.com](http://www.the-neucom.com)), 2003 - 2006
3. Richard Walton, Dougal Greer, Nik Kasabov, Qun Song – *Cardio Vascular Disease Prediction System*, 2003
4. Song, Q. and N.Kasabov, ECOS MATLAB Toolbox, ([www.kedri.info](http://www.kedri.info)), 2002-2003
5. Abdula, W. and N.Kasabov, Speech recognition development environment, Department of Information Science, University of Otago, 1999
6. Deng, D., Koprinska, I., Kasabov, N., et al, The NZ Repository of Intelligent Connectionist-Based Modules and Systems – NZ-RICBIS, <http://divcom.otago.ac.nz/infosci/kel/CBIIS.html>
7. Kilgour, R., Kasabov, N., Kozma, R., Laws, M., et al. *HySPEECH/2 - An experimental software system for speech recognition and translation from English to Maori*, Windows95, PGSF FRST NZ/University of Otago, 1998, <http://kel.otago.ac.nz>
8. Watts, M., Kasabov, N., and Pearson, S. *FuzzyCOPE/3 - A hybrid fuzzy connectionist production systems environment*, MS Windows/Windows95, June 1998, University of Otago, <http://kel.otago.ac.nz>
9. Purvis, M., Kasabov, N., Zhang, F., et al. *AI/GIS hybrid intelligent information system for spatial information processing*, UNIX/SUN-ArchInfo, FRST NZ/University of Otago, 1997
10. Kasabov, N., Garden, J., Jones, P., Kilgour, R., Gray, A., et al. *FuzzyCOPE-1 & 2 - A hybrid fuzzy connectionist production systems environment*, MS Windows/Windows95, 1995-1997; University of Otago
11. Watson, C., Kasabov, N., Sinclair, S., Laws, M., Kilgour, R., and Kassabova, D., *Otago Speech Corpora on New Zealand English*, CD, Windows95/UNIX, University of Otago, 1995, <http://kel.otago.ac.nz>
12. Kasabov, N. et al, *COPE - Connectionist production systems environment*, MS DOS, Technical University of Sofia, 1992
13. Kasabov, N. and Nikolaev, N. *GESPAR - Generator of Expert Systems for Parallel Computers*, MS DOS, TU Sofia, 1990
14. Kasabov, N., Besenshek, D.Georgiev and Svetlin. *GESMI - Generator of Expert Systems*, MS DOS, VMS, TU Sofia, 1987

(k) Patents

1. N.Kasabov, M. Futschik, M.Sullivan, A.Reeve, *Method and Medical Decision Support System Utilizing Gene Expression and Clinical Information*, PCT/US03/25563, 15.08. 2003
2. N.Kasabov, A.Reeve, M. Futschik, M.Sullivan, and P. Guildford, *Medical Applications of Adaptive Learning Systems using Gene Expression Data*, Patent USA, PCT WO 03/079286
3. N. Kasabov, A. Ghobakhlo, *Adaptive Sound and Image Learning System and Method*, PCT WO 2005/038774 A1.
4. Kasabov, N., and Q. Song, *Transductive Neuro-Fuzzy Inference Method for Personalised Modelling*, PCT WO 2005/048185 A1.
5. Kasabov, N., *Adaptive learning system and method*, Patent USA, PCT WO 01/78003, 18.10.2001
6. Kasabov, N., and Abdulla, W., *Speech recognition system and method*, PCT patent, WO 02/23525 A1
7. Kasabov, N., *Multi-microprocessor system*, 258015 Czechoslovakia, 2/6/1989
8. Kasabov, N. and Dakovski, L. *Stack Memory Device*, 1026164 Russia, 1/3/1983 (in Russian)
9. Dakovski, L. and Kasabov, N. *Bus-register device for information processing*, 4 362 926 USA, 7/12/1982
10. Dakovski, L. and Kasabov, N. *Numerical Control of Machines*, 2037040 UK, 24/11/1982
11. Dakovski, L. and Kasabov, N. *Stack Memory Device*, 4 305 138 USA, 8/12/1981
12. Dakovski, L. and Kasabov, N. *Arithmetische Registereinrichtung* Offenlegungsschrift, DE3128816A1 Bundesrepublik Deutschland, 22/7/1980
13. Dakovski, L. and Kasabov, N. *Dispositif memoire formant pile*, 79 26385 France, 24/10/1979

Patents (inventions) published in Bulgarian language (The titles are translated in English. Pre-prints in the original language are available from the author or from the Institute of Inventions in Sofia, Bulgaria)

14. Kasabov N. et al, *A variable word- length computer memory*, 62135, Bulgaria, 19/08/1983
15. Kasabov, N. *Multi-microprocessor system*, 36605 Bulgaria, 22/9/1983
16. Kasabov, N. and Dakovski, L. *Method for permutation of data records*, 35714 Bulgaria, 1/4/1983
17. Kasabov, N. et al, *An electronic device for a direct access to computer memory*, 36902 Bulgaria, 18/11/1983
18. Kasabov, N. and Dakovski, L. *Arithmetic register device*, 33404 Bulgaria, 22/07/1980
19. Kasabov, N. *n – switch element*, 29707 Bulgaria, 05/02/1979
20. Kasabov, N. and Dakovski, L. *Cyclic automata*, 27684 Bulgaria, 3/5/1978
21. Dakovski, L. and Kasabov, N. *2<sup>n</sup> – Universal device for realisation of permutation automata*, 26333 Bulgaria, 1/3/1978
22. Dakovski, L. and Kasabov, N. *A method and a device for realisation of asynchronous automata*, 26334 Bulgaria, 27/3/1978
23. Dakovski, L. and Kasabov, N. *An electronic device for realisation of finite automata*, 26335 Bulgaria, 27/3/1978
24. Kasabov, N. and Dakovski, L. *A method and a bus register device for the realisation of sequential finite automata*, 29106 Bulgaria, 08/11/1978
25. Dakovski, L. and Kasabov, N. *Stack Memory Device*, 29114 Bulgaria, 08/11/1978
26. Dakovski, L. and Kasabov, N. *A method for discrete signal commutation and control of electronic commutation devices*, 25630 Bulgaria, 31/5/1977

(l) Other Creative Works

Kim, J., Kozma, R., Kasabov, N., Gols, B., Geerink, M. and Cohen, T. A fuzzy neural network model for the estimation of the feeding rate to an anaerobic waste water treatment process, Departmental Technical Report, Department of Information Science, University of Otago, August 1998  
 Kasabov, N, 20 entries in the Short Bulgarian Encyclopaedia for Mathematical and Physical Sciences, 1988-90 (in Bulgarian)

*University Service*

(a) Positions held within Department/School/Division

Last 10 Years

Member of the Research Committee, Faculty of Design and Creative Technologies, Auckland University of Technology, 2005-

Member of the Research Committee, Faculty of Business, Auckland University of Technology, 2003-2004  
Founding director of the Knowledge Engineering Research Laboratory <http://kel.otago.ac.nz>, Department of Information Science, University of Otago, 1994-2002  
Member of the Graduate Committee, Information Science Department, University of Otago, 1994 – 2001

**Prior to the last 10 Years**

Deputy Director of the Artificial Intelligence Research Laboratory, Technical University of Sofia-Bulgaria, 1987-91  
Member of the Faculty Board, Faculty of Automation and Computing, Technical University in Plovdiv, Bulgaria, 1987-91  
Deputy Dean for International Relations, Faculty of Radio-electronics, Technical University of Sofia, 1987-89

**(b) Positions held at University level**

**Last 10 years**

Member of the Academic Board, Auckland University of Technology, 2002-2004  
Founding director of the Knowledge Engineering and Discovery Research Institute, [www.kedri.info](http://www.kedri.info), Auckland University of Technology, since June 2002  
Co-ordinator and principal researcher of the University Emerging Research Theme “Connectionist-based information systems”, University of Otago, 1996-2002

**Prior to the last 10 years**

Director of International Graduate School in AI, TU Sofia, 1988-91

**Professional Activities**

**(a) Academic and Professional Advice and Services**

Top Achiever Doctoral Committee (Bright Future Scholarship Committee) FRST NZ, since 1999  
RSNZ, Member of the new fellow selection committee, 2003-  
Otago Institute Council (The Otago Branch of the Royal Society of New Zealand), 1998 till 2002  
Marsden Fund, New Zealand, Reviewer, since 1996.  
FRST (Foundation for Research Science and Technology, New Zealand), Reviewer, since 1994.  
Australian Research Council, Research proposal reviewer, since 1995.  
Multiple Sclerosis Society, Australia, Research proposal reviewer, 1996.  
Royal British Society, UK, Research proposal reviewer, 1992-1997.  
School of Pharmacy, University of Otago, Consultant on a PhD research project, 1995-1998.  
School of Physical Education, University of Otago Consultant on a PhD research project, 1997.  
Departments of Psychology and Computer Science, University of Otago Consultant on a MSc project, 1994-1997.  
Centre of Neuro-sciences, Sofia, Bulgaria, Consultant and project proposal reviewer, 1990 - 92.  
University of Essex, UK, Convenor of a multi-disciplinary seminar on neural networks, 1991.

**(b) Service to External Academic and Professional Activities**

(i) Service to, or leadership in, academic discipline or professional associations:  
APNNA, President, 2007-2008  
INNS, President Elect, 2007  
INNS, Vice president and Member of the Governing Board, 2005-2007  
IEEE, Senior Member, since 2001  
IEEE Computational Intelligence Society, Neural Networks technical Committee, Adaptive systems taskforce co-ordinator, since 2004  
IEEE Computational Intelligence Society, Intelligent Systems Applications technical Committee, Taskforce co-ordinator on Biomedicine and Bioinformatics, since 2004  
IFIP (International Federation for Information Processing) – member of the TC12 group and chair of 12.2 sub-group, 1998-2004.  
APNNA (Asia Pacific Neural Network Assembly) – member of the Governing Board, since 1993.

New Zealand Computer Society, Chairman of the "Artificial Neural Networks and Expert Systems" Special Interest Group - ANNES SIG, 1993-1996  
IEEE Robotics and Automation Society, Member of an International Board, 1996-98

General Conference Chair and co-chair of professional conferences

ICONIP'2008, 25-28.11.2008, Auckland, General Chair  
NNN08, 24-25.11.2008, Auckland, Program Chair  
HIS 2007, Program co-chair, Kaiserslautern, Germany, September, 2007  
IJCNN'2007, Florida, USA, Program Co-Chair  
HIS & NCEI'06, Auckland 13-15 2006, General Chair  
EFS, 2006, Lancaster UK, Co-Chair  
ICANN'2005, Poland, Tutorial chair  
ICONIP'2004 – Calcutta, November 2004, Program Chair  
IJCNN/FUZZ IEEE, 2004 – Program, vice-chair, Budapest, 2004  
ICONIP'2003 – The 13<sup>th</sup> International Conference on Neural Information Processing, Istanbul, July 2003, Tutorial Chair  
WCCI'2002 – The World Congress of Computational Intelligence, May 2002, Hawaii, Program co-chair of IJCNN2002  
JCIS'2002, Chair of the Workshop on “Adaptive systems for speech recognition” Durham, March, 2002  
FUZZ/IEEE 2001 – The 10<sup>th</sup> IEEE International Conference on Fuzzy Systems, Melbourne, Australia, December 2001, Scientific Area Chair  
ANNES'2001 - The Fifth New Zealand International Conference on Artificial Neural Networks and Expert Systems, Dunedin, New Zealand, November 2001  
IES'2001 – The 5<sup>th</sup> Australasia-Japan Joint Workshop on Intelligent and Evolutionary Systems, Dunedin, New Zealand, November 2001  
ICONIP'2001 – The 8<sup>th</sup> International Conference on Neural Information Processing, Shanghai, China, November 2001, Chair (International Promotion)  
IIZUKA'2000 – An international conference on soft computing, Japan, Program chair  
ICONIP'99 - The Sixth Asian Pacific International Conference on Neural Information Processing, jointly with ANZIIS'99 and ANNES'99, Perth, Australia, November 1999  
ICONIP'97 - The Fourth Asian Pacific International Conference on Neural Information Processing, jointly with ANZIIS'97 and ANNES'97, Dunedin, November 1997  
ANNES'95 - The Second New Zealand International Two-Stream Conference on Artificial Neural Networks and Expert Systems, Dunedin, November 1995  
ANNES'93 - The First New Zealand International Two-Stream Conference on Artificial Neural Networks and Expert Systems, Dunedin, November 1993

Organiser and Chairman of Invited Sessions at International Conferences

2006, WCCI - IJCNN and FUZZ-IEEE, 3 special sessions, Vancouver, 2006  
2005, IJCNN'2005, Computational neurogenetic modelling (with L.Benuskova)  
2004, ICONIP'2004, Adaptive intelligent systems (with Prof. Yamakawa)  
2003, JCIS'2003, Chair of the Workshop on “Adaptive systems and brain-like computing”, Durham, September, 2003  
2003, Track organiser, ICONIP'2003, July, 2003, Istanbul  
2002, Special session organiser, ICONIP'2002, Singapore, November  
2002, Special session organiser, JCIS'2000 – Joint Conference on Information sciences, USA  
2000, Workshop organiser, JCIS'2000 – Joint Conference on Information sciences, USA, Atlantic City  
1999, Workshop “Future directions for intelligent systems and information sciences”, November, Dunedin, 1999  
1999, Special session “Adaptive speech recognition”, ICONIP'99, Perth  
1996, Neuro-fuzzy models and adaptive information systems, ICONIP'96, Hong Kong, 13-17 September  
1996, Hybrid systems for knowledge engineering, Iizuka'96, Japan, 3-7 October  
1994, Hybrid systems, Iizuka'94, Japan, 1-8 August

1994, WWW'94-IEEE/Nagoya University Wise person Workshop on Fuzzy Logic and Neural Networks/Evolutionary Computation, Nagoya, Japan

Member of international programme committees

ICANN 2007, Porto  
IJCNN 2006, Vancouver  
FUZZ-IEEE 2006, Vancouver  
ICANN 2006, Athens  
KES 2006, UK  
IJCNN'2005, Montreal  
ICANN'2005, Warsawa  
ICONIP'2004, Calcutta  
IJCNN'2004, Budapest  
ICONIP'2003, Istanbul  
ICONIP'2002, Singapore  
IAE'2002, Australia  
ICAIS'2002 - Australia  
ICONIP'2001 – Shanghai, November 2001  
CEC'2001, Korea, May 2001  
IJCNN'2000 – Como, Italy, July 2000  
Iizuka'2000 – Iizuka, Japan  
CEC'2000, San Diego, July 2000  
ICONIP'2000 – Seoul, November 2000  
Neural Computation'2000 – Berlin, 2000  
Joint Conference on Information Sciences JCIS, Atlantic City, USA, 2000  
ICONIP'99 - The Sixth Asian Pacific International Conference on Neural Information Processing, Sydney, October 1999  
IJCNN'99- Washington DC, July 1999  
ICONIP'98 - The Fifth Asian Pacific International Conference on Neural Information Processing, Kitakyushu, Japan, October 1998  
IIZUKA'98 - International Conference on neural networks, fuzzy systems and soft computing, Iizuka, Japan, October 1998  
ICNN&B'98 - International Conference on Neural Networks and Brain, Beijing, 27-30 October 1998  
AI'98, Australian Joint Conference on Artificial Intelligence, 13-17 July 1998, Brisbane, Australia  
EIS'98 – International ICSC symposium on Engineering Intelligent Systems, Tenerife, Spain, February 11-13 1998  
NC'98 – International Symposium on Neural Computation, Vienna, Austria, September 23-25 1998  
AID'98 - International Conference on AI in Design, Portugal, July 1998  
ISSCI'98 - Second International Symposium on Soft Computing for Industry, Anchorage, Alaska, USA, May 10-14, 1998  
EIS'98 - International ICSC Symposium on Engineering of Intelligent Systems, Spain, February 1998  
WMC'97 - World Manufacturing Congress, Auckland, November 1997, Programme Chairman of a Symposium  
GeoComputation'97, University of Otago, August 1997  
IFSA'97 Seventh World Congress of the International Fuzzy Systems Association, June 25-27 1997, Prague  
BOFL'96 - International workshop on breakthrough opportunities for fuzzy logic, Yokohama, Japan, December 1996  
ACNN'96 - The Seventh Australian Conference on Neural Networks, Sydney  
ICONIP'96 - The Third Asian Pacific International Conference on Neural Information Processing, Hong Kong  
IIZUKA'96 - International Conference on neural networks, fuzzy systems and soft computing, Iizuka, Japan

ANZIIS'96 - The Fourth Australian New Zealand Conference on Intelligent Information Systems, Adelaide, November 1996, Liaison Chair for New Zealand  
AID'96 - International Conference on AI in Design, Carnegie Melon University, USA, Vice-chair for New Zealand  
FLAMOC'96 - International Conference on Fuzzy Logic and the Management of Complexity, Sydney, January 1996  
FUBEST'96 - The Second Workshop on fuzzy based expert systems, Sofia, October 1996  
SIC'96 - International Panel Conference on Soft and Intelligent Computing, Budapest, October 1996  
ICONIP'95 - The Second International Conference on Neural Information Processing, Beijing  
ANZIIS'95 - The Third Australian New Zealand Conference on Intelligent Information Systems, Perth, 1995, Liaison Chair for New Zealand  
ACNN'95 - The Fifth Australian Conference on Neural Networks, Sydney,  
WWW'95 - IEEE/Nagoya University Wise person Workshop on Fuzzy Logic and Neural Networks/Evolutionary Computation, Nagoya, Japan  
CFSA/IFIS/SOFT'95 - International Conference on Fuzzy Theory and Applications, Taiwan  
ICONIP'94 - The First International Conference on Neural Information processing, Seoul, Korea  
ANZIIS'94 - The Second Australian New Zealand Conference on Intelligent Information Systems, Brisbane, Liaison Chair for New Zealand  
AIA'94 - The Second International Round-Table on Abstract Intelligent Agents, Rome, Italy  
AIMSA'90 - Artificial Intelligence - Methodology, Systems, Applications, Varna, Bulgaria  
AI'88 - Artificial Intelligence, Sozopol, Bulgaria, Vice-chair of the programming committee

(ii) Editorship of journals and periodicals.

*Associate Editor and Member of Editorial Boards:*

Neural Networks, Elsevier, since 2007  
IEEE Transactions of Fuzzy Systems, since December 2007  
International Journal of Neural Systems, World Scientific, since 2005  
IEEE Transactions of Neural Networks, since December 2005  
The International Journal of Hybrid Intelligent Systems, since 2004  
IEEE Transactions of Industrial Informatics, Associate Editor, 2004-2007  
Computational and Theoretical Nanoscience, American Scientific Publishers, since 2003  
Information Sciences, Elsevier Science, Associate Editor, since 2001  
Applied Soft Computing, Elsevier, since 2000  
International Journal of Computational Intelligence and Applications, Imperial College Press, London, since 2000  
Neural Information Processing: Letters and Reviews, since 2004  
Journal of Advanced Computational Intelligence and Informatics, Japan, since 1997  
Biomedical Fuzzy and Human Sciences, Japan, 1996-2001  
Australian Journal of Intelligent Information Processing Systems, since 1996

*Guest editor of special issues of journals:*

Journal of Computational and Theoretical Nanoscience, Computational Intelligence for Bioinformatics, 2005  
Int. Journal of Comp. Intelligence and Applications, 2004  
Information Sciences: 2003, 2001, 1998 and 1997  
Journal of Advanced Computational Intelligence: 1998  
Australian Journal of Intelligent Information Processing Systems: 1998 and 1996  
International Journal of Intelligent Systems: 1997  
Fuzzy Sets and Systems: 1996

*Reviewer of international journals:*

IEEE Transactions on Neural Networks, since 1994  
IEEE Transactions on Fuzzy Systems, since 1995  
IEEE Transactions on Systems, Man, and Cybernetics, since 1995  
Information Sciences, since 1995  
IEEE Transactions on Industrial Electronics, 1997

IEEE Trans. Data and Knowledge Engineering, since 2003  
Informatica, since 1997  
Journal of Advanced Computational Intelligence and Informatics, since 1997  
BioSilico, since 2004  
Applied Soft Computing, since 2003  
Int. Journal of Comp. Intelligence and Applications, since 2002  
Australian Journal of Intelligent Information Processing Systems, since 1994  
Fuzzy Sets and Systems, North Holland, since 1994  
Lecture Notes in Computer Science/Artificial Intelligence, since 1994  
Medical and Biological Engineering and Computing, England, 1992 -1996

### Community Service

(a) Continuing Education, Community Debate and Community Development

(i) *Some media commentaries and columns on professional matters:*

*NZ Herald, April, 2008*  
*The NZ National Business Review Magazine, The Bayer Innovation in Science Winner, December 2008*  
*NZ Computer World, November, 2005*  
*NZ Herald, 2002*  
*Who is Who in the World*, entries since 1995  
*Who is Who in Science and Engineering*, entries since 1995  
*Who is Who in New Zealand*, since 1999  
*Otago Daily Times*, December, 2001, September 1999, May 2000  
*Who is Who in Asia and the pacific Nations*, since 1999  
*People of the 20<sup>th</sup> century*, Cambridge Biographical Centre, since 1999  
*International authors and writers - Who is Who*, Cambridge Biographical centre, since 1999  
*Marquis Who's Who in America*, entries 1995- 2000  
*World Directory of Mathematicians*, listed in the NZ's entry, 1998  
*Bulgarian National Radio*, Interview, 01/1998  
*Bulgarian newspaper "24 hours"*, Article on Intelligent Robots, 01/1998  
*TVNZ*, 2 interviews, 11/1977  
*Quickface*, The New Zealand Computer Society Monthly Bulletin, 8 articles on intelligent information systems and ANNES SIG, 1995-96  
*National Radio, NZ*, Interview with Diana Burns on Intelligent information systems, 11/1996  
*Southern Television* news report on ANNES'95 conference and on a Research Project, 11/95  
*Otago Daily Times*, Report on ANNES'95 conference and on a Talking Computer Project, 11/95  
*Campus Review*, vol.5, 1029, article on a research project, 1995  
*4XO Gold Radio Station Dunedin*, Interview, 07/1995  
*Dunedin Star Weekender*, article by Frank Campbell, 06/1995  
Five articles on computing published in a general public magazine "Eni Hayat", Bulgaria; 1982-88 (in Bulgarian)  
A series of five radio programmes on Computer science, National Radio, Bulgaria; 1982 (in Bulgarian)

(ii) *Conferences, seminars, and workshops (including invited addresses to community groups on professional matters; only activities aimed at the general community)*  
12 lectures at secondary schools in Sofia, Bulgaria, on computing in education, 1985-89

(iii) *Public lectures*

"The World of Information, where Science, Art and Engineering Meet", Faculty of Design and Creative Technologies, AUT, April 2007  
"Knowledge Engineering, Neurocomputing and Knowledge Discovery", Royal Society of NZ, Wellington, November, 2002  
"Knowledge Engineering and Knowledge Discovery", Inaugural Professorial Lecture, Auckland University of Technology, September 2002

"Artificial Intelligence – Myth, or reality", Eranos lecture, University of Otago, September 2001  
"Connectionist systems for data mining and knowledge discovery in Bioinformatics", University of Otago, 2001  
"Data, information and knowledge and their metamorphoses" – lecture at the Otago Institute, Royal Society of New Zealand, Dunedin, May 2000  
"Intelligent systems for a knowledge-based society", Inaugural Professorial Lecture, University of Otago, 22 September 1999  
"Intelligent Information Systems: the present and the future", for the members of the IEEE Chapter, Singapore, November 1994

(iv) *Provision of continuing education*

Hands-on-Science summer school - project leader, University of Otago, 1995.  
Hands-on-Science summer school - project leader, University of Otago, 1994.

(b) *University Links Supporting other Providers of Community Service*

(i) Polytechnics, Colleges, Schools

Polytechnic, assistance in curriculum development, Southland Polytechnic, Invercargill, 1995  
Southland Polytechnic, Invercargill, a series of lectures - 1993 and 1994  
Joint projects with secondary schools, Sofia, Bulgaria, 1987-89  
Joint seminars for university and school students, Sofia, Bulgaria, 1987-89

(ii) Other Universities

Examiner of postgraduate research theses (last 15 years)

Nanyang Technological University, Singapore, PhD Thesis, 2007  
Nanyang Technological University, Singapore, PhD Thesis, 2007  
Indian Statistical Institute, PhD thesis, 2007  
Nanyang Technological University, Singapore, PhD Thesis, 2006  
Indian Statistical Institute, PhD thesis, 2006  
Auckland University of Techn., Masters thesis, 2006  
University of Auckland, PhD thesis, 2005  
Lincoln University, PhD thesis, 2004  
Deakin University, Australia, PhD thesis, 2004  
University of Auckland, PhD thesis, 2002  
Deakin University, Australia, PhD thesis, 2003  
University of Auckland, PhD thesis, 2002  
University of Auckland, Masters thesis, 2002  
University of Auckland, PhD thesis, 2001  
Massey University, PhD thesis, 2001  
University of South Australia, PhD Thesis, 2000  
University of Western Australia, PhD Thesis, 2000  
Auckland University, PhD thesis, June 2000  
Swinburn University, Australia, PhD Thesis, September 1999  
Auckland University, PhD thesis, September, 1999  
Swinburn University, Australia, PhD Thesis, March, 1999  
Auckland University, PhD thesis, April, 1999  
Swinburn University, Australia, PhD Thesis, 1998  
Massey University, PhD Thesis, 1998  
Swinburn University, Australia, PhD Thesis, 1997  
University of New South Wales, Australia, PhD thesis, 1997  
Massey University, PhD thesis, 1997  
Auckland University, PhD thesis, 1997  
Auckland University, Masters thesis, 1996  
Massey University, Masters thesis, 1996  
University of Canterbury, Masters thesis, 1996  
University of Canterbury, PhD thesis, 1995  
Massey University, 2 PhD theses, 1995  
Auckland University, PhD thesis, 1994

Nanyang University of Technology, Singapore, 2 Masters dissertations, 1994

Seminar talks and lectures at other Universities and Scientific Institutions (last 15 years)

University of Oxford, Oxford, UK, October 2007  
Imperial College, London, UK, October 2007  
University of Reggio di Calabria, Italy, October 2007  
University of Trento, Italy, September 2007  
University of Coimbra, Portugal, September 2007  
University of Ulster, Londonderry, October 2006  
Mackay University, Queensland, Australia, April 2006  
University of Lausanne, Switzerland, December 2005  
University College of London, Medical School, December 2005  
Frounhoffer Institute and UNI-Kaiserslautern, Germany, November 2005  
University of Lancaster, UK, September, 2005  
Bulgarian Academy of Sciences, August 2005  
University of Nagoya, Nagoya, Japan, June 2005  
University of Natural Sciences, Ho Chi Min City, Vietnam, June 2005  
University College London, 2004  
TU of Sofia, Bulgaria, 2004  
TU of Keiserslautern, Germany, 2004  
Kyushu Institute of Technology, Japan, 2004, 2001  
Kobe University, Japan, 2004  
Ritsumeikan University, Japan, March 2003 and May 2002  
University of California at Berkeley, July 2002 and December 2003  
Stanford University, USA, July 2002  
National Cancer Institute, Washington DC, May 2002  
Pohang University, Korea, 2000  
University of Auckland, June 2000  
IRST and University of Trento, May, 2000  
University of California at Berkeley, July 1999  
University of Milano, June 1999  
University of Ulm, Germany, June 1999  
University of Venice, May, 1998  
University of Trento, Italy, May, 1998  
University of Naples, Italy, April, 1998  
University of Essex, UK, December 1997  
University of New South Wales, Sydney, Australia, April 1997  
University of Keiserslautern, Germany, 1995  
University of Trento, Italy, 1995  
National Research Institute in Milano, 1995  
University of Canterbury, 1995  
Nanyang University of Technology, Singapore, 1993  
University of Nottingham, U.K., 1991  
King's College, University of London, UK, 1991  
University of York, U.K., 1991  
University of Essex, U.K., 1991

(c) Cultural and/or Scientific Access, Participation and Development

Participation at musical concerts at the conferences Iizuka' 2000, 1996, 1994, and ICONIP 07, Japan  
Participation at folk music festivals, Dunedin, 1994

Date: 7 May 2008

Signed:

